

# MERRY CHRISTMAS



## NITE-TIMES NEWS

### CHICAGO AREA TIMEX USERS GROUP

Chicago Area Timex Users Group  
Volume 7, Number 6

Downers Grove, Illinois  
November/December 1993

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### C.A.T.U.G. CLUB OFFICERS

Here is the list of 1993 club officers and how to contact them. The club has two strong SIGs, SPECTRUM/TS2068 and QL. If you have questions about either of these fine machines or even the ZX81/TS1000/TS1500 call one of the officers. C=312, S=708.

POSITION	NAME	PHONE	PRIMARY FUNCTION
President	Nazir Pashtoon	S439-1679	The buck stops here...
Vice-President	Steve Cooper	S968-3553	Meeting Planning, etc.
Secretary	Jim Brezina	S832-1782	Records and Reporting
Treasurer	Frank Mills	S544-1918	Dues and Purchasing
Editor	Bob Swoger	S576-8068	Newsletter, BBS, etc.

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### NITE-TIMES NEWS

## Nite-Times Information

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The Nite-Times News is the newsletter of the Chicago Area Timex Users Group. For an annual fee of \$12.00 you can become a CATUG member and receive six newsletters each year. Write your check payable to:

FRANK MILLS  
417 S 47th AVE  
BELLWOOD IL 60104

The Chicago Area Timex Users Group is pleased to exchange newsletters with other Timex and Sinclair supporting user groups at no charge. Send all newsletter requests to:

CATUG EDITOR BOB SWOGER  
613 PARKSIDE CIRCLE  
STREAMWOOD IL 60107-1647

If you desire to reprint any articles that appear here, please provide credit to the author and this newsletter.

We encourage your user group to copy this newsletter and distribute it at your regular meetings to your members free of any charge as we believe that this will encourage better meeting attendance. If you are a user group that feels as we do, please let us know in your newsletter so that we might do this for our members and keep our attendance up.

Articles originating from our group may be downloaded from our BBS and reprinted.

### CONTRIBUTORS TO THIS ISSUE

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Cedric Bastiaans  
Al Feng  
Frank Mills  
Larry Sauter  
Bob Swoger, K9WVY

### CLUB MEETINGS

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The Chicago Area Timex Users Group meets on the THIRD Saturday of each month at the

home of our meeting coordinator Steve Cooper in Downers Grove, Illinois from 1:00 to 5:00 PM. Steve's home is lovingly called the CLUB HOUSE and is located at 1300 Maple Street in Downers Grove just 2 blocks southwest of the Downers Grove Public Library. Steve should always be contacted evenings at 708/968-3553 to confirm the meeting schedule.

### TREASURY NOTES

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The balance as of Dec. 30, 1993 is \$351.73. Our current paid membership stands at 19.

Frank Mills, Treasurer  
Chicago Area Timex Users Group

### SECRETARY'S NotePad

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November 20, 1993

The meeting opened at 2:35 PM. Present were Bob Swoger, Larry Sauter, Abed Kahale, Steve Cooper, Nazir Pashtoon, John Donaldson. Frank Mills was absent because of dental surgery.

Jay Siegel reportedly was on his way to Skokie from New York although nobody has been able to confirm this as of this writing. Jay wished to be present at a CATUG meeting so that he might show us another side OF TS2068 computing with CP/M rather than the LarKen and JLO DOS that others of our group use.

Bob Swoger has been working with Abed Kahale on all kinds of pictures called RLEs for Bob's collection, including 5 pictures of Bob's daughter and put into a program such as a paint program that Abed has and manipulated any way that you want. Pictures can be stretched and pasted. The Chicago skyline that appears on the cover of the Nite Times News has been manipulated and stretched and is now part of the document

which has a very pleasing appearance.

There is some interest in a Timex Sinclair Fest in Toronto Canada in the Summer. We have two or three here interested in going and SMUG has approximately 5 people who are interested in going.

The new Motorola Micro Computer Club machine is now in Arlington Heights IL running RBBS contains RLE and PICT files and electronic mail. The number will be published elsewhere in Nite-Times News. You get on it by giving it your name and your phone number as well as your password which shouldn't be forgotten. You can't do anything the first day which is a day of registration and after the next day you are upgraded from a security clearance of 0 to 5 and you get all the privileges of the BBS.

LogiCall has been upgraded from 5.0 to 5.1. On disks with Spectrum programs, the Spectrum ROM can be up and running by pressing the "N" key and the AUTOSTART programs switches ROMs for you and you are running in the Spectrum mode.

John Donaldson may become the QL Chicago Area Timex Sinclair User Group public domain Liberian, which he tentatively accepted. The meeting closed at 3:00 P.M.

**December 18, 1994**

Meeting began at 2:20 P.M. Those present: Nazir Pashtoon, John Donaldson, Frank Mills, Steve Cooper, Abed Kahale, Larry Sauter and Bob Swoger.

The first discussion was of Jay Siegel's visit to the home of Bob Swoger. Also present were Abed Kahale and Nazir Pashtoon. Jay's visit was late one Saturday evening but he stayed till well after midnight to show the fellows as much of his wares as he could show. He had

with him his TS2068/ZEBRA system with 4 drives and gobs of CP/M software. Other hardware included an OKIDATA color printer, Commodore and Tandy color plotters, a SMUG scanner and 2400 baud modem. **(Here is the person to talk to, Joan Kealy. NAP)** Jay showed us McMichaels scanner software. He produced color pictures and color plots, the plotter was able to the printed word in both color and great detail.

Rod Gowen returned checks for Jack Dohany's ROM switch kit for side by side 2068 Spectrum ROMs. (Jack Dohany's EPROM burner burned up.) Should not be switched while machine is in the powered up mode. If you have the kit, you should turn off the power to the machine. Alternate proposals were discussed that might benefit the T/S community and will be investigated. The meeting closed at 3:33 P.M.

QL update discussed. Pashtoon showed a production disk drive interface which included a parallel printer output socket. He rewired this and redesigned it to include 512K RAM where it originally had 64K of RAM. Pashtoon demo'd some programs which will probably be added the CATUG QL public domain disk/disks.

Larry Sauter, Secretary  
Chicago Area Timex Users Group

## **GATOR's TWISTED PAIR**

!!! R E M E M B E R !!!  
We have a 24 hour BBS and encourage you to exchange mail and contribute to the Download Section. Use it and have fun!

Call the BBS at 708-576-7083 and register. On your next call your security level will be increased to 5 on this RBBS and you will have all privileges.

Bob Swoger, SYSOP  
Chicago Area Timex Users Group

## ITEMS FOR SALE THROUGH THE CLUB

It has come to our attention that some LarKen Users are using something less than Version 3 firmware. The club will supply updated EPROMs, SYSTEM DISKS, and MANUALS for just \$5 which includes shipping and handling, free if ordered with LogiCall or Spectrum ROM.

If you are a LarKen LKDOS owner and would like a SPECTRUM V2 kit for your system we will supply an EPROM, socket and 74HCT32 for \$12 which includes shipping and handling. The install instructions are in your LarKen manual. We shall not be responsible for your install job. AERCO owners need only the SPECTRUM EPROM for \$10

If you have a mismatch between you LarKen DOS EPROM and your Western Digital Controller chip, we will send you the correct one for free on behalf of our friends Rod Gowen of RMG and Larry Kenny of LarKen. You should be using L3 EPROMs with WD1770 controller chips or L3F EPROMs with WD1772 controller chips. Check it out! Call in requests to Bob Swoger at W708-576-8068 H708-837-7957

## SPECIAL DEALS AND BUYS

NAP\_Ware (Nazir A. Pashtoon's new endeavor) announces the availability of all Timex or QL PAL (Programmable Array Logic) chips. If interested, call him evenings on 708-439-1679.

LogiCall Integrated Software Ensemble easy operating system for LKDOS in both TS2068 and Spectrum modes includes LogiCall 5.0 TASWORD TWO V2.8, VU-CALC V1.6, VU-FILE and MTERM2 Drivers modified for LogiCall, DISKS.B1 TAPES.B1 steprt.B1 HEADER.BT (tape header reader by Nazir Pashtoon) FORMAT.B MOVE.BL and more all on 2 SSDD disks for \$15. You must specify your LKDOS EPROM version. If you

already have a copy you are encouraged to distribute copies to other LarKen LKDOS users for as you see by the price we are not in the business of making money on it, just making LarKen's LKDOS even better! Call in requests to Rod Gowen of RMG Enterprises or Frank Davis of Mechanical Affinity.

So you like to fly? The 747 Flight Simulator for Spectrum by Derek Ashton of DACC sold over 40K copies in EUROPE. Requires Spectrum Emulator. At this time supplied on LarKen SSDD disk only for \$10 which goes to Derek Ashton, now working at MOTOROLA with Bob Swoger. Call in requests to Bob at W708-576-8068 H708-837-795

## CATUG 1993 MEMBERSHIP LIST

Member	Comptr	MassStore
Jim Brezina*	2068	Zebra
Steve Cooper	2068	JLO
Bob Currnutt	2068	LarKen
John Donaldson	QL	Trump
Lee Dorenson	2068	Tape
Ruth Fegley	2068	LarKen
Al Feng	QL	Gold
Cy Herre	QL	MicroDr
Abed Kahale	2068	LarKen
Dave Lebowicz	2068	Tape
Joan Kealy	2068	LarKen
Leo Majewski	QL	MicroDr
Frank Mills	2068	LarKen
Nazir Pashtoon	QL	Cumana
Larry Sauter	2068	LarKen
John Shepard	2068	LarKen
Mike Stevens	2068	RAMAX
Bob Swoger	2068	LarKen
Grant Thomas	QL	MicroDr
Lee Thorsen	2068	Tape
Ike Walker	2068	JLO
Ivan Zachov	2068	JLO/LKDOS

\* Silent Key

## ADS

FOR SALE 940101  
\*\*\*\*\*  
MIRACLE 512K EXPANDERAM ... \$75  
TRUMP FLP/RAM ..... \$35  
Al Feng (505) 843-8414  
914 Rio Vista Circle SW  
Albuquerque, NM 87105

Wanted: 940304  
 %%%  
 FOR CoCo 2 only Universal Video  
 Driver for Composite Video;  
 Disk Drive 0 5.25" Floppy  
 Disk Drive Controller w/ cable;  
 RS-232 "Y" cable; Any ROM  
 cartridge programs; Any  
 cassette programs; Any TRS-80  
 CoCo books other than Color  
 BASIC and Extended BASIC books.  
 Larry Sharpe  
 PO BOX 62156  
 CINCINNATI OH 45262-0156

FOR SALE 940304  
 %%%  
 CoCo3 128K - CoCo3 512K  
 Disk DR 0 Disk DR 1 & 3 (DSDD)  
 4 Disk Controllers  
 2 EPROM burners  
 MPI (PAL) Soft case  
 For CoCo:  
 MODEM 2, LIGHT CONTROLLER  
 LINE PRINTER 120  
 DIGISECTOR DS-60/69B  
 SPEECH SOUND CARTRIDGE  
 COCOMAX  
 ALL DISK PROGRAMS ALL TAPES  
 1 DELUXE JOYSTICK, 4 JOYSTICKS  
 MOUSE - GRAPHICS TABLET  
 VIDEO INTERFACE  
 KINGS QUEST III  
 COCO2 64K  
 DISK DR 0  
 CONTROLLER  
 CASS&CABLES 2 JOYSTICKS MPI  
 TRS-80 MODEL III (RS)  
 48K 2 DISK DRIVES AND ALL  
 SOFTWARE TO HERE!!!!  
 \$300 TAKES ALL  
 BARRY RUCHALSKI 708-742-7775

FOR SALE 940304  
 %%%  
 I have one (1 count'em) Nuvotel  
 96424IFX internal fax/modem for  
 sale. It does data at 2400bps  
 and faxes at 9600bps. I have  
 used it for about a year and it  
 performs flawlessly. Data side  
 has V.42bis compression & error  
 correction protocols and MNP  
 classes 2,3,4, and 5. Fax is  
 group 3 compatible with V.29,  
 V.27 ter, V.23, V.22bis, V.22,  
 and V.21 recommendations. (That  
 means it does a good job). \$30  
 gets it. Includes DOS software  
 and everything to hookup.  
 Mark Hall (214)262-8320  
 hallmark@netcom.com

FOR SALE 940304  
 %%%  
 YEASU FT101 EX TRANSCEIVER \$250  
 5 BAND VERTICAL \$50  
 BARRY 708-742-7775

FOR SALE 11/1/93  
 %%%  
 Ten-Tec Argonaut 509 QRP xcvr,  
 PS, filter calibrator & manual.  
 .....\$450 OBO  
 Hy-Gain TH3-Jr Tri-band Antenna  
 balun .....\$200 OBO  
 CushCraft Ringo A-2 2mtr Ant  
 \$25 Call Dave 708-991-6810 eves

FOR SALE 940304  
 %%%  
 SINCE I GOT IT AT A GOOD PRICE,  
 I'LL BE GLAD TO GIVE IT UP AT  
 A GOOD PRICE. INDIVIDUAL PARTS  
 OR ALL TOGETHER. YOUR CHOICE.  
 NEW AMIGA 500 IN BOX ALL DOCS.  
 .....\$250  
 EXTRA DISK DRIVE .....\$25  
 EXTRA 512K RAM CARD .....\$25  
 AMIGA MONITOR AND CABLE ...\$150  
 1200 BD MODEM .....\$20  
 APPLE CARTRIDGE WITH ROMs . \$200  
 MIX AND MATCH, MAKE ME AN OFFER  
 CALL BRUNO RUSSO 708-587-7140

FOR SALE 11/1/93  
 %%%  
 RAM upgrades for MAC Four 1 Meg  
 Simms for sale. .... \$29  
 Call Chris 708-519-0700

FOR SALE 940304  
 %%%  
 1. Os-9 C-Compiler.....\$20  
 2. Os-9 Level 11.....\$10  
 3. Color Profile.....\$10  
 4. Os-9 Level I  
    with Basic09\* .....\$10  
 5. Basic09 Tour Guide Book  
    .....FREE with 2 or 4 above.  
 6. Complete Rainbow Guide to  
    OS-9 Book  
    ...FREE with 2 or 4 above.  
 \* Item #4 contains vs. 01.01.00  
    & vs. 02.00.00  
 Tandy Cat. no's. 26-3030

& 700-2331  
 CAUTION: "YOU" pay all mailing  
 costs. Inquiries should indicate  
 need for either or both of the  
 books. Farrell Kenimer  
 2601 W. Corrine Dr.  
 Phoenix, Az 85029-2579



FOR SALE 11/1/93  
\*\*\*\*\*  
Apple 14" RGB color monitor &  
Laserwriter LS printer both one  
year old.  
Call Dana 708-383-5363

## ARTICLES

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### QLUSTER Upgrade by Al Feng

QLUSTER has recently (some will say finally!) undergone a long awaited upgrade which had been partially delayed by a year of voluntary service (servitude?) in Western New Mexico (on the Eastern Navajo Reservation, as they like to say/suggest to the potential donors).

As of mid-October (1993), the latest release version is 5r109. The significant change which prompted the new version number was the ability to access already "made" sub-DIRECTORIES structures.

Sub-DIRECTORIES [ ... -> ]

Access to the sub-DIRECTORIES is performed by simply pressing the appropriate key designate as you might for an individual file. QLUSTER will determine that it is NOT a file, and go about the task of retrieving and displaying the sub-DIRECTORY.

The sub-DIRECTORY will be "in play" even if you change the device to a floppy which does not have a sub-DIRECTORY structure. The net result may be an empty page if no files exist with the appropriate DIRECTORY prefix.

Return to the main DIRECTORY via a SELECT\_DEVICE option (press '0' to access).

If the disk you are using has sub-DIRECTORIES [i.e., " ->"], but your QL does not have not have the MAKE\_DIR command, then QLUSTER will (at last attempt)

simply access the first file in that sub-DIRECTORY. Subsequent files will not be accessible other than via WCOPY or WDELETE.

Greater "crash" protection

Time away from QLomputing has helped me resolve the problem of my version of TURBO (2.00) implementing file type recognition. It is believed that the only reason QLUSTER will hang-up/crash now is if the EXECutable file is corrupt and does not load properly, or if you are attempting to load binary code created by (yes, you guessed it) DIGITAL whose binary code apparently "looks" like EXECutable code to the QL ... a solution to this is to place such code in its own sub-DIRECTORY (e.g., "Turbo\_TK\_code" has hung up my QL when testing the F(ile)TYP(e) check; so, I have placed it within its own sub-DIRECTORY to prevent my accidentally attempting to EXEC\_W it).

Okay, I'm sure there must be another way to CRASH the program, but I'm trying to avoid thinking about it (them).

QLUSTER 5.109 will now "ask" whether or not your printer is READY before it will attempt to send a file down the line.

QLUSTER requires TK2\_EXT code.

Same upgrade policy as before to anyone who has acquired a copy of QLUSTER either directly from me, through EMSOFT, or UPDATE! Just send \$2.00 to cover the cost of a new disk (specify size) and the postage and handling (as they say). Send comments/questions/queries to:

Al Feng  
914 Rio Vista Circle SW  
Albuquerque, NM 87105  
U.S.A.

HAPPY TRAILS,  
AND COMPUTING, TO YOU ...

\*\*\*\*\*  
**KEYBOARD MANIA - Part 5**  
\*\*\*\*\*

By Cedric R. Bastiaans ©

Page A

NOTE 1:

I encountered several problems with intermittent ribbon cable connections in the original TI cable of the TI-99/4A KB. From just one, to ten (!) out of the fifteen conductors! This is probably caused by these keyboards being surplus and therefore not packaged (= not protected) and thusly subject to a lot of abuse.

In hindsight it is therefore much better to REMOVE the original TI cable altogether, use a new 7-inch length of 13-conductor ribbon cable instead of the 5-inch one I recommended in paragraph IX.8 of Part 4. Then, do away with the 15-pin header strip and check out your modified circuit board directly against the solderpads 1 through 15. Solder the new ribbon cable directly to these pads, again using the "twistor" instructions of figure 13.

NOTE 2:

This installment will again address itself to keyboards in general. It will give you hints and tips on finishing your keyboards, either a large, multiple-key version or a modified TI-99/4A.

Details on the installation of the Korean-made (SE-JIN) TI keyboard (beige keys) will follow at a later date.

But I have again to voice my opinions about this version of that keyboard. I stress the point that the Japanese-made (ALPS) KB (black keys) is much to be preferred. Compared to it, the SE-JIN KB requires more PCB trace-cuts, more jumpers, has confusing, poorly executed keyswitch symbols making it VERY EASY to make mistakes in your modification efforts. In addition, though the physical modifications to the computer case are certainly not impossible to do for most of you, they're more involved.

Then there are some subjective considerations. I already gave you my impression of the tactile feel of the SE-JIN KB, but there is also the beige color of its key's. It's my considered, artistic opinion that BEIGE does not look good on SILVER!

— X. HOUSING AND/OR FINISHING THE KEYBOARD

X.1 LARGE KEYBOARDS

It is imperative that you find yourself a suitable housing for the keyboard AND the computer board.

I think it's ludicrous to have your keyboard in a case separate from the computer case, like for instance the Memotech KB for the TS1000/ZX81. The Sinclair/Timex computer systems already suffer from the many piggy-backed add-ons they so often require; one doesn't need yet another, large-size add-on!

I have found a keyboard/computer case that is just perfect for our TS2068.

It is made by L M B, 2946 East 11th Street, Los Angeles, CA 90023 and it is their model KB-17 "The Keyboarder", measuring 7" deep x 17.25" wide x 3" high in the back and 1.5" in the front.

I do not know if L M B would accept mailorder or OTC purchases; I bought my case from ITC Electronics in LA. It is certainly worth finding out or otherwise have your favorite electronics store order one for you.

The LMB case is made in two U-shaped parts and had plenty of room for my TS2068 computer board, the two extra PCB's for dedicated key circuitry and the 77-key full travel keyboard (36 dedicated key functions!). Figure 15 is a photograph of the case, opened up to show its contents. The computer board is mounted on stand-offs, next to the leftmost and rearmost case walls.

I had to make several cuts in the case, which is made of aluminum and therefore easy to work with.

Cutouts were made in the lefthand wall, for the ON-OFF SWITCH, the DB-9 JOYSTICK PORT and I also made an opening for a SAVE/LOAD SWITCH.

In the rear are 5 cutouts for the POWER, TV, EAR, MIC and MONITOR receptacles as well as 2 more, for another DB-9 connector (RGB output) and for the EXPANSION PORT. The computer board needs careful alignment, to insure proper mechanical and electrical connection of peripherals to the expansion port.

The second joystick port is too far away from the righthand case wall and I have elected not to use it. I don't play shoot 'em-up games on my computer and consider one joystick port sufficient for any of my needs. If you do need the second port, use a set of male/female DB-9 connectors and a short 9-conductor cable to make yourself an extension.

Then there is an opening in the bottom of the case for the little loudspeaker. I suggest you use something to protect the speaker cone (I used a piece of perf-board).

The case top needs of course a cutout for the keyboard and I also added an opening for an LED AC power light.

There is no room nor is there a need for a lift-up door for the "COMMAND CARTRIDGE". Instead, I made an opening in the front wall and used plastic parts of the now expendable computer case to construct a proper loading ramp for the cartridges, Spectrum ROM emulators and such. The cartridge "disappears" completely into the case, when inserted, so it requires a "retrieval" loop tied to its handle. To prevent undue collection of dust, I cut the expansion port COVER to size, to fit the opening I made for the Command Cartridge port.

Since I also have leather craft and woodworking as other hobbies, it stood to reason that I would finish my computer case with genuine black morocco leather, while the endpieces are veneered with real Brazilian Rosewood.

I'm quite proud of this combination and since there is no TS2068 nor a Spectrum like it, I've dubbed it "SPECTRE 2086" and this logo is proudly displayed on the case, in dark-red letters and numerals, a 3-dimensional epoxy-cast, also a product of my own hand...

Figure 16 shows the Spectre 2086, but the xerographic copy of a photograph does not do this thing of beauty any justice!

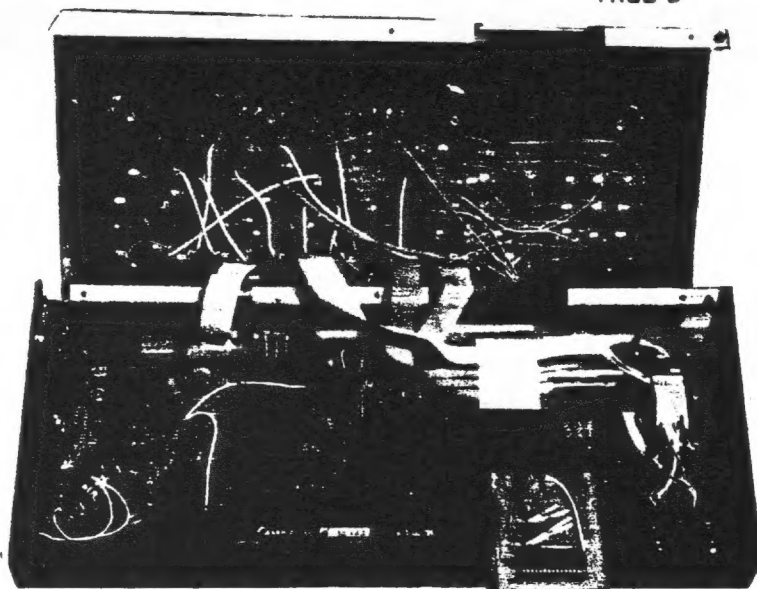


FIGURE 15

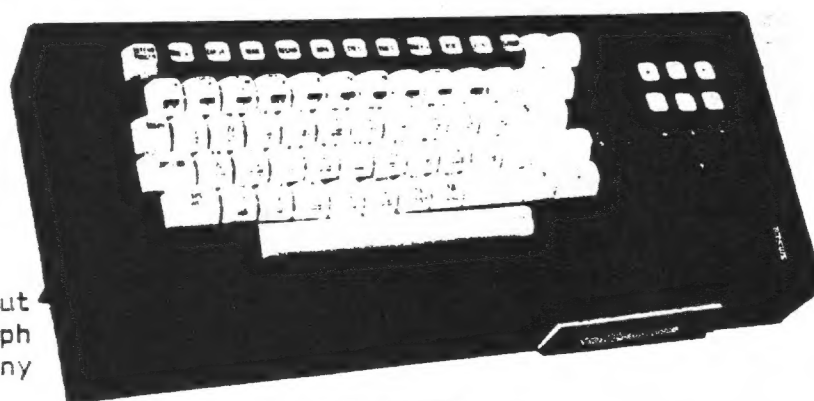


FIGURE 16

## X.2 THE TI-99/4A KEYBOARD

To pretty up the hardware project explained and detailed in Parts 3 and 4 of this series, I constructed a "mask" around the TI KB as it is mounted in the TS2068 case, using 1/8 inch BALSAWOOD, available in hobby shops.

Pieces of this wood can be very easily cut with our trusted #11 Xacto knife and glued to the metal frame-work of the TI KB with fast-curing epoxy. IT SHOULD NOT BE GLUED TO THE COMPUTER CASE! It can be made to cover the entire periphery around the keyboard and will still allow the removal of same...



The balsa mask is easily constructed; rounding appropriate corners should make it look quite pleasing. The wood is to be sealed with balsa filler coat (Aero Gloss 70-1, available in hobby shops) and sanded. Next, a coating with sanding sealer (Aero Gloss 71-1) and again sanded. A spray or two of quick-drying silver paint will give the case a very good-looking finish.

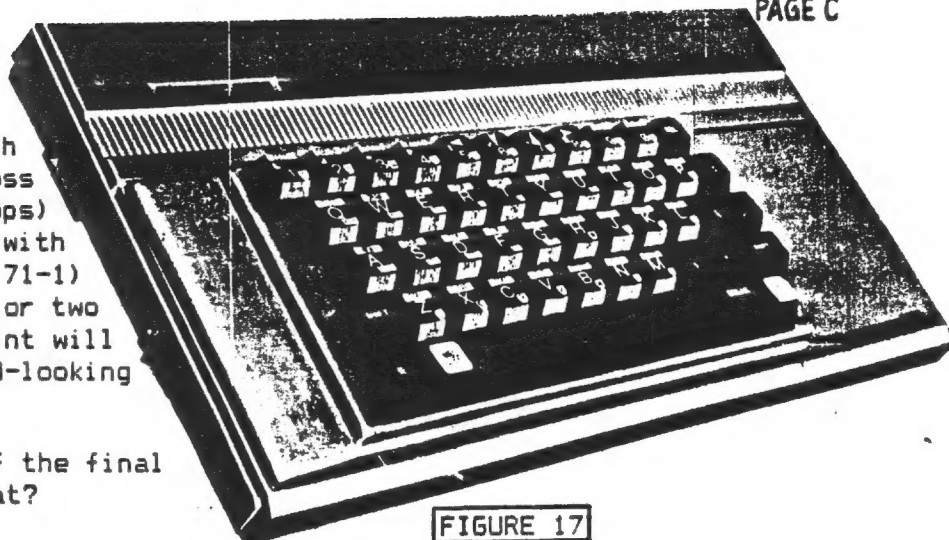


FIGURE 17

Figure 17 is a photograph of the final project. Doesn't it look neat?

## XI. THE KEYTOPS

Probably the most time-consuming job is the making of keytops. There is unfortunately no source for ready-made keytops, like there was in the days of the TS1000/ZX81 (Mule Electronics in the Los Angeles area).

I did see sheets of Spectrum keytops, printed on paper without any adhesive backing (how stupid!), but these are of such awful artistic quality, I would not wish them on the keyboards of my worst enemy! They also have rather GARISH red and green colors. I can not recommend them...

So what to do? I have to suggest two approaches to this problem.

But first, I need to discuss the next, related topic.

### XI.1 KEYBOARD "MAKE-OVER"

Ever since I've been involved in constructing real keyboards for the TS2068, I've followed a particular philosophy and maybe I can get you to side with me. Bear in mind that we have no room around the keys, so that all legends need to find a place on the keys themselves.

#### XI.1.1 - Keytops should be COMPLETE.

This means that functions and commands, not shown on the original 2068 KB, should be included. I'm talking about CONTRAST (key 9), TRANSPARENT (key 8), the COPYRIGHT symbol © (key P) and the BRACES (keys F and G).

#### XI.1.2 - I think that the keytops should reflect the TRUTH

What this means then, is that the GRAPHIC SYMBOLS (keys 1 through 8) should be depicted like the resulting video image! In other words the black part on the keytop design should correspond with the black symbol on screen!

#### XI.1.3 - Keytops should be COLOR CODED.

All my keyboards show SYMBOL SHIFT in red letters on white keytops. The corresponding symbols on the various keys are likewise in red on white. This makes for very easy recognition of these symbols, just like they were on the original ZX81/TS1000 keyboards.

On my 77-key KB, the EXTENDED MODE key is powder-blue, and the corresponding dedicated functions like READ, DATA, RESTORE etc. are black, but have a powder-blue top.

CAPS SHIFT is green on white, the corresponding shifted functions on the numerical keys 1 through 0 are also in green. The thought behind this is that these legends are to be put on the same line as the keywords on other keys and should therefore be differently indicated. Doesn't this make sense?

Fully color-coded keytops are only possible with transfer lettering, see paragraph XI.2.

XI.1.4 - TOKENS/KEYWORDS are important commands and should therefore be prominently indicated on the keytops. Thusly I have made them the uppermost legends, whereas I have put the EXTENDED MODE functions together, on the front slope of the keys, with the standard EM on top and the additionally SHIFTED EM function immediately below it. I find that these functions are then so much easier to locate.

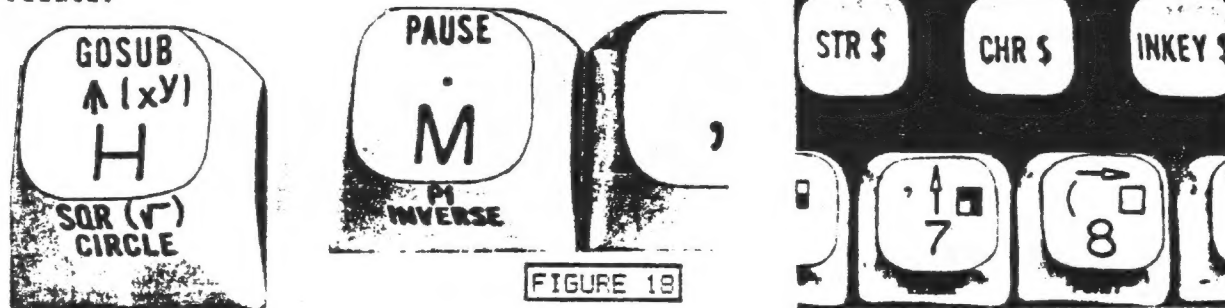


Figure 18 clarifies my intend; compare this with the corresponding keytops on the original TS2068 KB.

Then there are the additional color indications on keys 1 through 0 (BLUE through BLACK, including TRANSPARENT and CONTRAST on keys 8 and 9). These are to be put on the first line of the front key slope; on my large keyboard they are in white on a black background, to remind us that they are NOT EM-functions.

XI.1.5 - The ENTER key should be prominently marked and therefore be painted ALL RED, especially with the TI-99/4A keyboard, whose ENTER key is not any larger than the other keys, contrary to the norm.

## XI.2 USING TRANSFER LETTERING

These are the well-known "rub-on" letters and numerals, which can be obtained in a vast variety of fonts, sizes and also colors. Look for them in a large artist supplies store (like H.G.Daniels in LA). Not only do such stores have a large stock, they are also the ones that carry the better brands, such as Letraset and CHART-PAK. I can not vouch for the lesser known brands often carried by drugstores and department stores. Besides, they don't offer much choice.

Using rub-on lettering requires a good deal of patience and manual dexterity. I know that some people simply can not master this and they always wind up with "dancing" letters that are also inconsistently spaced.

I prefer transfer lettering, because it can lead to very professional looking keytops, that are hard to distinguish from the real thing.

The keys have to be clean and dustfree before the transfer lettering is applied. The transfers should be properly burnished and the keys should be given several coats of a clear lacquer or varnish. BUT FIRST, CHECK THE CHEMICAL COMPATIBILITY OF THE CLEAR COAT WITH THE TRANSFERS!! Some coats could dissolve the transfers...

## XI.3 USING A FULL-SIZE DOT MATRIX PRINTER

Realizing that many people may not have the patience, agility or artistic inclination for transfer lettering, I have devised a method using an 80-column dot matrix printer, black and red ribbon and adhesive-backed 1"x3.5" labels. The latter should be of the PERMANENT type and not be removable.

The ribbon should preferably be brand-new, but if you have the MSCRIPT wordprocessor, it is possible to make high-contrast printings using the built-in BOLD FACE mode, IN ADDITION to the DOUBLE STRIKE mode of your printer!

Use the CONDENSED printmode on your printer (17 char./inch) and type all 26 keywords, 25 EM commands, 33 SHIFTED EM commands (these do NOT include the 3 characters on keys Y, U and D), 6 shifted commands of keys 1 - 4, 9 and 0, 10 "color" commands (incl. TRANSPARENT and CONTRAST), BREAK, ENTER, DELETE and other dedicated keytops on the labels, leaving adequate spaces between them. These should be in BLACK. Don't forget to add the 3 hidden characters of paragraph

Note: each word should be limited to seven characters, so type INV.VID instead of INV. VIDEO, TRU.VID rather than TRUE VIDEO.

Similarly, in RED, type 8 spelled-out symbols (AND, OR etc.)

In addition, SYMBOL SHIFT (the two words should be typed on two lines, one directly below the other) and this should be done twice. Leave plenty of room around these prints; we are going to make a complete keytop out of them, covering the entire upper surface of the key.

Now switch to the ELITE print mode (12 char./inch) and type all the remaining 28 symbols (!, @, # etc.). You will find that it is not possible to type symbols like <=, <> or >=. You will have to compose them with the symbols <,> and =.

Back to BLACK and still in the ELITE mode. Print the remaining 3 characters [, ] and \. Also, the 8 graphic symbols on keys 1-8; most dot matrix printers have them. Remember to do these symbols "in reverse", e.g. the symbol on key 1 should be black in the first quadrant and not in the 2nd, 3rd and 4th, as erroneously depicted on the TS2068 keyboard.

Having successfully done all of the above, we are ready to cut the labels to size.

With a #11 Xacto knife, carefully cut 11 x 3 millimetre labels, properly centering the keyword, symbol or command.

Do the same with the red symbols, but limit the length of the labels to the size of the command or symbol (minimum of 3 mm for single-digit symbols, maximum of 7 mm for the longest spelled-out symbol commands).

Cut a complete keytop surface label around the SYMBOL SHIFT printings.

Next, cut out the eight graphic symbols.

Fancy your own arrowheads for the 4 cursor keys.

There is no need to replace the existing TI keytops for SHIFT (2x)

I do hope that I have been sufficiently clear in the foregoing. But I should leave something to your own judgement and creative abilities.

Using tweezers, peel-off each label and carefully position it on the appropriate key. The labels should then be firmly burnished, using a smooth piece of plastic. I like to use the cap on a "Sharpie", the well-known permanent fine-point marker. I have to emphasize cleanliness in these operations; fingerprints cause body oil to inhibit the permanence of adhesion.

Next, finish the keys on five surfaces with several coats of clear lacquer.

Figure 19 shows a typical key, finished as per above instructions. Compare it with the "S"-key on the TS2068 keyboard.

Keytops, fashioned in the manner explained by me, are surprisingly sturdy. This installment and the previous one were all typed on my first modified TI KB, in addition to typing in over 20,000 characters into a data base.

There appear to be no signs of wear! I know from experience that the original TS2068 keytops would not have survived this without some signs of scuffing...

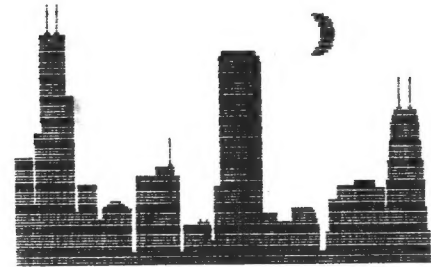
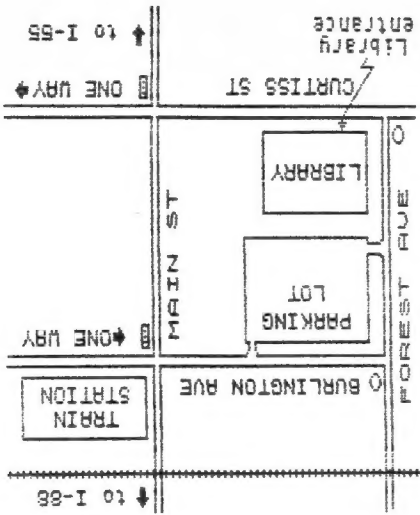


FIGURE 19

I sincerely hope that you will indeed try the hardware projects described in these pages. Believe me, you won't know the joy of having a full-travel keyboard on your computer(s), until you own and work one!

Next installment: instructions to implement the SE-JIN TI keyboard...

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